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ABSTRACT

This study was designed to determine whether mastery learning instruction at the secondary level is more effective than other instructional strategies. Seven teams of teachers in five school districts participated in the investigation. Subjects taught were middle school history and language arts, high school government, mathematics, history, and junior high science. After teams of teachers had been selected for the project, training in mastery learning was initiated. Staff development sessions included an overview session of the basic concepts of mastery learning and the specific strategies necessary for teaching for mastery. As mastery learning in project schools commenced and progressed, each teacher kept a daily or weekly log of reactions and comments about the project. At the end of the project period, each teacher summarized the process of using mastery learning in their subject. Although not all of the teachers completely endorsed mastery learning at the end of the project as a means to improve student achievement, they did agree that the training, and teaching using mastery learning had improved their planning and instruction. The teachers related that they had advanced in curriculum organization, test construction, and classroom management. Even those who had previously used individualized instruction felt the requirements of mastery learning had infused more specificity into their planning and teaching. (JD)

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# MASTERY LEARNING IN SECONDARY SCHOOLS:

## A FIRST YEAR REPORT

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To determine the effect of using mastery learning techniques at the secondary level, eight teams of teachers were trained to redesign their curricula to be taught using mastery learning strategies. Subsequently, seven teams of teachers involving 490 students used mastery learning instruction for the final quarter of the school year in four content areas. In comparing grades of that quarter with either the previous quarter of the same year or the final quarter of the previous year, five of the student groups had a substantial increase in the number of students who received A and B grades, while two groups of students had no significant difference.

Mastery learning is a strategy for improved instruction based on the mastery learning theory developed by Benjamin Bloom and his students. Bloom originally outlined his theory in "Learning for Mastery" (1968), and later explained the theory in more detail in Human Characteristics and School Learning (1976). Mastery learning differs from individualized instruction in that mastery of content is based on group instruction, rather than individually paced instruction. Students remain together in initial teaching by the instructor, but remediation of weaknesses through a process called correctives is individualized.

Strategies for mastery learning developed by Bloom originated with a model of school learning developed by John Carroll (1963). Carroll described learning as related to the student's aptitude for learning

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versus the amount of time the student was given to learn. Bloom transformed Carroll's conceptual model by including the logic that differential instruction could provide for differences in aptitude.

Procedures used in mastery learning include the following components: specifications of behavioral objectives of the course; formation of a final or summative exam based on course objectives; organization of curriculum material into units; formation of formative tests for units; and design of correctives for each unit to be used with students who do not master information of initial instruction. Bloom (1976) reported research indicating that four-fifths of students can achieve at a high level using mastery learning, while Block and Anderson (1975) claim virtually all students can and will learn when taught using mastery learning techniques.

Research on mastery learning is fairly extensive. The ERIC report, Mastery Learning and Mastery Testing (1977) cites 136 studies. Results of mastery learning in research studies is mixed. In ERIC/TM Report 63, Perspectives on Mastery Learning and Mastery Testing (1977) it was reported that successes have been found in a variety of subjects at various age levels; however, only one study showed the level gain suggested by the theory. The ERIC study also indicated that mastery learning is more successful in subjects which have a natural sequential order such as math, science and foreign language. There was less success found in courses such as English, reading and social studies.

The present study was designed to determine whether mastery learning instruction at the secondary level is more effective than other instructional strategies. The investigators wished to determine not only if cognitive

achievement would be improved, but also to ascertain the students' reaction to being taught with mastery learning instruction.

## Method

### Subjects

Initially 10 teams of teachers volunteered and were accepted. Because of turnover in teaching personnel and incomplete data, seven teams in five school districts were used to assess final project results.

The teacher teams and student groups represented middle school and high school campuses ranging from a small rural school to larger rural and suburban school districts. A breakdown of each team, content area and number of students follows:

| Content Area | Number of Teachers | Number of Students |
|---|---|---|
| Middle School History | 2 | 156 |
| High School Government | 1 | 44 |
| High School Mathematics | 1 | 34 |
| Middle School Language Arts | 3 | 99 |
| High School History | 1 | 52 |
| High School Mathematics | 1 | 68 |
| Junior High Science | 3 | 39 |

### Design

Mastery learning units were taught in six schools during the final spring quarter of 1979. Each unit was twelve weeks long. The final student grades were either compared with student grades from similar content taught in the spring quarter of the 1978 school year or compared with grades from the previous quarter of 1979. Same year comparisons had

to be made in two situations where the same course content was not taught the previous year.

To determine student attitude toward mastery learning, each student was given a questionnaire of Student Perceptions of Mastery Learning Instruction (Table 1.1). Teachers reported their perceptions and were interviewed periodically by an on-site observer, who made at least three visits to each school during the implementation phase of the project.

Simple percentages were used to report comparisons of student achievement between experimental and control groups. Percentages were also used to summarize student perceptions of mastery learning.

Materials

Curriculum materials were designed or adapted by each team of teachers. Following training, each team organized their curriculum area into the framework required for mastery learning. The curriculum document for each content area included formative and summative tests and correctives which represented a variety of learning modes. Available commercial materials which were suitable for initial instruction and correctives were purchased to supplement teacher designed materials and basal textbooks.

Procedures

After teams of teachers had been selected for the project, training in mastery learning was initiated. Over a period of time from November, 1978 through January, 1979, a total of 15 days was devoted to staff development sessions in mastery learning and curriculum development. Training sessions were adapted from the process evolved by James Block and Loring Anderson as presented in Mastery Learning in Classroom Instruction (1975). Prior to the training teachers individually studied Mastery Learning in Classroom Instruction and a representative from each school made an on-side visit to the Denver mastery learning project.

1.1 A SUMMARY OF STUDENT PERCEPTIONS OF MASTERY LEARNING INSTRUCTION

| | Rarely | Sometimes | Usually | Always |
|---|---|---|---|---|
| The teacher explained what mastery learning is at the beginning of the quarter | 36<br>9% | 80<br>19% | 172<br>41% | 129<br>31% |
| The teacher told us at the beginning of each term unit what we were supposed to learn. | 25<br>6% | 87<br>20% | 106<br>24% | 227<br>51% |
| The teacher gave me formative tests during the quarter and the grades did not count. | (NO) 47 | | | (YES) 339 |
| The teacher gave us corrective activities after the formative tests if we needed them. | 37<br>8% | 76<br>17% | 100<br>23% | 228<br>52% |
| Students studied different amounts of time during the quarter in order to do well. | 63<br>15% | 119<br>28% | 144<br>34% | 101<br>63% |
| The teacher told me about my progress several times during the quarter. | 133<br>31% | 144<br>33% | 93<br>21% | 63<br>15% |
| The teacher gave students special help during the quarter if they needed it. | 82<br>19% | 130<br>31% | 99<br>24% | 110<br>26% |
| Students were encouraged to help one another during the quarter. | 90<br>21% | 91<br>21% | 122<br>28% | 136<br>31% |
| The tests for the units covered what the teacher said we needed to learn. | 12<br>3% | 58<br>13% | 120<br>27% | 257<br>57% |
| I'm satisfied with my achievement during this quarter | 48<br>11% | 89<br>20% | 177<br>40% | 125<br>28% |
| I can learn better using mastery learning. | (NO) 88<br>22% | | | (YES) 313<br>78% |

Staff development sessions included an overview session of the basic concepts of mastery learning and the specific strategies necessary for teaching for mastery. These strategies included the development of unit sequences, the development of unit tables of specifications, the writing of formative and summative tests, and planning of corrective teaching activities. As the teachers developed their own curriculum, they were given assistance and feedback and clerical support for preparation and reproduction of their curriculum document.

As mastery learning instruction in project schools commenced and progressed, each teacher kept a daily or weekly log of reactions and comments about the project. At the end of the project period, each teacher summarized the process of using mastery learning in their situation with their reflections and suggestions about the project. These impressions were submitted with completed student questionnaries and final grade reports. As part of the data recorded, teachers also indicated changes which needed to be made in their curriculum design.

The on-site observer visited each project throughout the implementation period. The purpose of these visits was to observe the progress of mastery learning instruction, provide support to the teams and record ongoing perceptions of students and teachers.

## Results

The final grade reports of the project indicate that five teams in four schools reported a substantial increase in the number of students who received A and B grades in mastery learning instruction. Teachers at two schools reported no significant difference in student achievement. The results of the student perceptions as recorded in the questionnaires

indicate that (1) mastery learning was implemented in an appropriate manner and (2) a majority of the students noted that they could learn better using mastery learning. Results of teacher interviews indicate that (1) a mastery learning sequence was implemented and (2) most teachers believe that a large percentage of students had better achievement using mastery learning. Reports of the individual schools follow:

Middle School History

Two teachers designed a unit on Civil Was and Reconstruction and taught the unit to 156 eighth grade students. A comparison of student grades follows:

| 1978 | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 41 | 32 | 29 | 17 | 5 | 124 |
| Percent | 33% | 26% | 23% | 14% | 4% | 100 |
| 1979 | | | | | | |
| Number of Students | 84 | 40 | 27 | 3 | 2 | 156 |
| Percent | 54% | 26% | 17% | 2% | 1% | 100 |

On the student questionnaire, seventy percent of the students reported that they could learn better using mastery learning. Their teachers agreed. The on-site observer found that students who had consistently received poor grades responded positively to the opportunity to try again with corrective teaching. Poor students who did not originally respond, later were also encouraged to work toward mastery when they observed other students who had normally not made good grades were successful.

High School Government

A social studies teacher designed a unit on Legislative Processes for forty-four seniors. A comparison of student grades follows:

| 1978 | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 25 | 11 | 7 | 0 | 0 | 42 |
| Percent | 59% | 25% | 16% | 0 | 0 | 100 |
| 1979 | | | | | | |
| Number of Students | 35 | 7 | 1 | 1 | 0 | 44 |
| Percent | 80% | 16% | 2% | 2% | 0 | 100 |

Sixty-eight percent of the students reported that they could learn better using mastery learning. Their teacher agreed. The on-site observer reported that this class was completely positive about the mastery learning approach. The students especially benefited from the feedback from the formative tests. The teacher reported that there was no "letdown" in learning as usually occurred with seniors in the spring quarter.

High School Mathematics

A mathematics teacher designed units on Consumer Mathematics and Basic Processes and taught them to thirty-four tenth, eleventh, and twelfth graders who were enrolled in a Fundamental Mathematics course. A comparison of student grades follows:

| 1978 | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 3 | 11 | 6 | 2 | 5 | 27 |
| Percent | 11% | 41% | 22% | 7% | 19% | 100 |
| 1979 | | | | | | |
| Number of Students | 7 | 15 | 7 | 3 | 2 | 34 |
| Percent | 21% | 44% | 21% | 8% | 6% | 100 |

The students, who normally resented being placed in the "Fundamentals" course, responded positively to the variety of problems and activities in the redesigned curriculum. A slightly higher percentage received A and B grades compared to the previous year.

Junior High Language Arts

Three language arts teachers designed grammar units and taught them to ninety-nine eighth graders. A comparison of the student grades follows:

| 1978 | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 7 | 13 | 15 | 12 | 29 | 76 |
| Percent | 9% | 17% | 20% | 16% | 38% | 100 |
| 1979 | | | | | | |
| Number of students | 36 | 15 | 15 | 17 | 16 | 99 |
| Percent | 36% | 15% | 15% | 18% | 16% | 100 |

Seventy-wto percent of the students reported that they could learn better using mastery learning. Their teachers agreed. The on-site observer said that initially the students and teachers were highly motivated. During the last month of school some of the enthusiasm had diminished. This team had previously used individually paced instruction. Students and teachers observed that mastery learning had resulted in improved organization of the curriculum, which was more clearly understoood by the students.

High School World History

A social studies teacher designed a world history unit on current history which was taught to fifty-two tenth graders. A comparison of student spring grades to their winter quarter grades follows:

| 1979- Second Quarter | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 14 | 13 | 10 | 6 | 7 | 50 |
| Percent | 28% | 26% | 20% | 12% | 14% | 100 |
| 1979- Third Quarter | | | | | | |
| Number of Students | 38 | 7 | 4 | 3 | 0 | 52 |
| Percent | 73% | 13% | 8% | 6% | 0 | 100 |

Sixty-three percent of the students reported that they could learn better using mastery learning. Their teacher agreed. The on-site observer noted some students who had normally made A did not want more students to make A. Students who had done poorly previously were highly motived to improve their grades.

High School Mathematics

A mathematics teacher prepared a unit on Basic Math Skills for sixty-eight low-achieving ninth and tenth grade students. A comparison of student grades follows:

| 1978 | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 3 | 14 | 21 | 12 | 15 | 65 |
| Percent | 5% | 22% | 32% | 18% | 23% | 100 |
| 1979 | | | | | | |
| Number of Students | 4 | 13 | 14 | 25 | 12 | 68 |
| Percent | 6% | 19% | 20% | 37% | 18% | 100 |

Seventy-three precent of the students reported that they could learn better using mastery learning. The on-site observer noted that the students expressed that they liked the opportunity to take the formative test more than once. The teacher stated that student attitudes were more positive even though the achievement results were not significantly different.

Junior High Science

Three science teachers designed and taught a unit on Plants to thirty-nine seventh graders. Included in this group were a number of mainstreamed students with special learning problems. A comparison of student grades follows:

| 1979- Second Quarter | A | B | C | D | F | Total |
|---|---|---|---|---|---|---|
| Number of Students | 3 | 9 | 10 | 8 | 9 | 39 |
| Percent | 8% | 23% | 26% | 21% | 23% | 100 |
| 1979- Third Quarter | | | | | | |
| Number of Students | 3 | 11 | 10 | 6 | 9 | 39 |
| Percent | 8% | 28% | 26% | 15% | 23% | 100 |

Eighty percent of the students reported that they could learn better using mastery learning. The on-site observer reported a very positive affective response from the students. The mainstreamed students especially enjoyed the experiments and the work in the greenhouse. The teachers and observer felt the unit was succeeding during the teaching process and were very disappointed with the achievement results.

## Discussion

The process of implementing mastery learning in secondary schools resulted in interesting revelations and problems. The in-service program brought to light special difficulties, especially with the premise that most students can learn well. Teachers who had previously used a form of individualized instruction or self-pacing had the least uncertainty in incorporating the additional processes into their teaching. Other teachers, even though they had volunteered for the project, were unable to completely accept the premise, regardless of data presented from other mastery learning projects. Interestingly, some of those most reluctant to believe in the theory later became advocates after it had been tried in their classroom. Other teachers remained just as convinced to the end of the project year that some of their students would do poorly.

The in-service sessions also revealed that many teachers lacked an understanding of goal directed teaching. These teachers resisted designing the final exam based on course objectives prior to organizing

their teaching activities. To their dismay they discovered a lack of correlation between instructional activities and evaluation of learning. This problem was overcome through repeated cross-checking between objectives, test questions, and corrective instructional activities.

Although not all of the teachers completely endorsed mastery learning at the end of the project in terms of student achievement, they did agree that the training and teaching using mastery learning had vastly improved their planning and instruction. The teachers related that they had advanced in curriculum organization, test construction and classroom management. Even those who had previously used individualized instruction felt the requirements of mastery learning had infused more specificity into their planning and teaching.

It is very difficult for some teachers to effect change in their own teaching, even if there is a substantial amount of support. Project teachers in most cases were unable to complete the reorganization of their curriculum within the time frame provided. In spite of these difficulties, most teachers in the project stated that the effort and time were well spent, and the task would be more easily managed in a second project year.

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